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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/727,242	11/30/2000	Hongyang Chao	P/3483-13	4365

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EXAMINER

JOHNSON, TIMOTHY M

ART UNIT	PAPER NUMBER
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2625

DATE MAILED: 08/19/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/727,242

Applicant(s)

CHAO ET AL.

Examiner

Timothy M Johnson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-27,29,30 and 32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-27,29,30 and 32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Disclosure

1. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

The specification does not support nor define what "modular arithmetic" is. The phrase "modular arithmetic" in claims 22 and 32 is assumed by the claim to mean the standard definition of modular arithmetic as defined and used in the field of mathematics. The specification does not clearly define the term. Modular arithmetic refers to the calculation and use of integer remainders from two integers, the mathematical congruence relation – "mod", the modulus, and arithmetic modulo – see page 55 of Lipshutz et al., Discrete Mathematics. The specification does not concretely set forth modular arithmetic directly being used. However, the specification does support using the well known lifting scheme and correction methods for implementing an integer wavelet transform. If this is Applicant's intention, then such is already provided by Kolarov in the first full paragraph in c. 8, and also mentions the wavelet transform by Said-Pearlman in the last full paragraph in c. 8 and the paragraph bridging cols. 8-9. In the previous Office action, paper #14, mailed December 9, 2002, see the rejection of claim 30, for example, which corresponds to Applicant's wavelet transform correction method, known as the S+P method of Said et al.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 22-27, 29-30, and 32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

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The phrase "modular arithmetic" does not appear in the originally filed specification, nor does the term "modular". It is not clear from the originally filed specification how modular arithmetic is used in the current invention, or exactly what is intended by using the phrase "modular arithmetic".

4. Claims 22-27, 29-30, and 32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The phrase "modular arithmetic" in claims 22 and 32 may be used by the claim to mean merely "integer arithmetic", while the accepted meaning is as noted above, c.f., page 55 of Lipshutz et al., *Discrete Mathematics*. The term is indefinite because the specification does not clearly redefine the term. It is not clear from the specification how the term/phrase "modular arithmetic" is being used/defined.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 22-24 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolarov et al., 6,144,773.

For claim 22, a method of compressing a data file having data elements each represented by a number of bits is provided by Kolarov in at least Fig. 3a, blocks 301 to 309, indicating a file and bits, c. 11,

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line 35 – c. 12, line 67, and bits are further provided by Kolarov in at least c. 7, lines 15-19. Performing a wavelet transformation of the data file using modular arithmetic to provide a series of wavelet coefficients, each of the coefficients being represented by a number of bits having a maximum count no greater than a number of bits representing each of the data elements is provided by Kolarov by at least the compression in Figs. 3a, and 4a – 4c, particularly, steps 309 and 326 in Fig. 3a, the fourth full paragraph in the first full paragraph in c. 8, c. 12, and c. 19, line 19 – col. 20, line 13. The phrase “modular arithmetic” is considered provided by the integer wavelet transforms of Kolarov where cited above, since these are the same transforms provided by the Applicant, e.g. the integer based lifting scheme. Discarding wavelet coefficients that fall below a predetermined threshold value is provided by Kolarov in at least the last full paragraph in c. 9 and the paragraph bridging cols. 9-10, where Kolarov also uses the zerotree coding as well, but on a modified tree (“G-tree”). See also the third full paragraph in c. 1 for a further suggestion of this conventionality. Quantizing remaining wavelet coefficients [which fall above a predetermined threshold value] to provide a quantized series of wavelet coefficients is considered provided by Kolarov in at least the second full paragraph in c. 5, the first full paragraph in c. 8 (quantization is explicitly recited), the first full paragraph in c. 14, the last full paragraph in c. 19, at least the last two full paragraphs in c. 9, which is analogous to Kolarov, except Kolarov uses different trees. Thus, quantizing is at least obviously, if not inherently, provided by Kolarov. It would've been obvious to one having ordinary skill in the art at the time the invention was made to understand that the thresholding of Kolarov is quantization by definition, where more important data, i.e. data with higher entropy information content are thresholded out from other data in the categorization process of Kolarov, so that the concept of quantization is taught by Kolarov, and because quantization is one of the three basic steps in compression, so that it is basically required where cited above by Kolarov. It further would've been obvious to one having ordinary skill in the art at the time the invention was made to quantize the data of Kolarov with a threshold, since the prior art, e.g. Said-Pearlman, incorporated by reference – last full paragraph in c. 8, of which Kolarov is a modification – c. 16, lines 38-48, and c. 17, lines 30-34, “have proposed a very fast and efficient method to bit encode wavelet coefficients” in c. 8, lines 56-59, and with thresholding for quantizing the coefficients

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in the subband tree in the last full paragraph in c. 9. Compressing the quantized series of wavelet coefficients to provide a compressed data file is provided by Kolarov in at least Fig. 3a, the abstract, the second and third full paragraph in c. 5, and the first full paragraph in c. 8.

For claim 23, wherein the compressing step comprises the step of applying an entropy coding to the quantized series of wavelet coefficients is provided by Kolarov in at least Fig. 3a, the abstract, the second and third full paragraph in c. 5, and the first full paragraph in c. 8.

For claim 24, wherein the entropy coding is selected from the group of arithmetic, Huffman, run length and Huffman combined is provided by Kolarov in at least Fig. 3a, the abstract, the second and third full paragraph in c. 5, and the first full paragraph in c. 8.

For claim 32, see the rejection of at least claim 22. A program with routines is further provided by Kolarov in at least the four full paragraphs in c. 7.

7. Claims 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolarov et al., 6,144,773, as applied to claims 22-24 and 32 above, and further in view of Ferriere, 5,880,856.

For claim 25, performing a color transformation of the data file prior to the wavelet transform is suggested by Kolarov by identifying a color function in at least step 313 in Fig. 3 noted in the last full paragraph in c. 12, but does not necessarily provided for the color being transformed. It is very common to transform the color with transformed based coding, such as wavelet, and is provided by Ferriere in at least Fig. 4. It would've been obvious to one having ordinary skill in the art at the time the invention was made to perform a color transform to the wavelet transformation step with the input image file of Kolarov, as taught by Ferriere, since his color conversion decouples the luminance, so that processing such as display preview is provided by Ferriere in at least the first full paragraph in c. 9, and because such color conversions either provide for compression per se, or are amenable to compression.

For claim 26, wherein the quantizing step comprises sub-band orientation quantization is considered provided by Kolarov, since the trees, as a result of wavelet decomposition, of Kolarov are oriented with respect to subbands, such as the example shown in at least Fig. 2, and quantizes the subbands as a function of the subband or wavelet tree. Further evidence is provided by Kolarov in the last full paragraph in c. 8, indicating that the tree based coding is a spatial orientation tree, and is quantized according to Kolarov as a modification of the Said-Pearlman technique. It would've been obvious to one having ordinary skill in the art at the time the invention was made that Kolarov provides for the subband orientation quantization, or that it can be used with Kolarov, since the subband trees are spatially oriented and quantized as a function of the subband oriented tree. The subbands are indicated in at least Figs. 1c and 1d, but also in the paragraph bridging cols. 2-3, and the subbands are again referred to (e.g. HL) in c. 16, lines 20-39.

8. Claims 27 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolarov et al., 6,144,773, and Ferriere, 5,880,856, as applied to claims 25-26 above, and further in view of Said et al., "An Image Multiresolution Representation for Lossless and Lossy Compression".

For claim 27, wherein the wavelet transformation step comprises integer wavelet transformation is not explicitly provided by Kolarov, but Kolarov does provide for the wavelet transformation by lifting, which either does or can use integer processing. Said (referred to as Said instead of Said-Pearlman noted above for differentiating the two) provides for the conventionality of integer transformation in hierarchical coding (e.g. wavelet coding) in at least the abstract. See also the paragraph bridging the columns on page 1308 indicating that the transform of Said is similar to the wavelet transformation technique of EZW. It would've been obvious to one having ordinary skill in the art at the time the invention was made to implement the lifting scheme of Kolarov with the integer transformation of Said, since the integer transformation provides for "fast inspection", and because Said also provide for efficient compression.

For claim 29, wherein the integer wavelet transformation comprises biorthogonal filter method is provided by Kolarov in at least the second full paragraph in c. 4, the fourth full paragraph in c. 5, and the first full paragraph in c. 8.

For claim 30, wherein the integer wavelet transformation comprises the correction method is not explicitly provided by Kolarov. Said et al. teach that it is well known to use the correction method for integer wavelet transforms starting in the paragraph bridging pages 1303 – 1304 and primarily in section II on page 1304, where the S+P transform used by Said et al. is a correction method (that Said et al. provide for a “correction method” is further indicated by the Applicant's specification on page 38, lines 13-15). It would've been obvious to one having ordinary skill in the art at the time the invention was made to use a correction method, as taught by Said et al., with one of the transforms of Kolarov, since “the S+P transform yields more compression than single-resolution linear predictive coding methods of similar complexity, and can be calculated with a very small computational effort”, because Said et al. “propose entropy-coding methods that exploit the multiresolution structure and that can efficiently compress the S+P transformed image for progressive-resolution transmission”, because Said et al. “propose an embedded coding method, and show that its rate distortion function is comparable to those of the most efficient lossy compression methods” for “progressive-fidelity transmission”, and that the “compression rates obtained with both types of progressive transmission are among the best in the literature”, so that “with the proper image transformation, fast inspection schemes can be readily combined with lossless compression, resulting in a negligible penalty in both compression efficiency and coding complexity”, as taught by Said in the paragraph bridging pages 1303-1304.

Final

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Response to Amendment

10. Applicant's arguments filed June 12, 2003 have been fully considered but they are not persuasive.

The Applicant argues on pages 4-9 of the amendment that none of the prior art of record, particularly Kolarov, provides for each wavelet coefficient being "represented by a number of bits having a maximum count no greater than a number of bits representing each of the data elements" of the image, since Kolarov "focuses on operations performed after wavelet coefficients have already been obtained, and because the wavelet transform of Kolarov is conventional;

The Examiner respectfully disagrees. In accordance with the Applicant's claim and invention, e.g. claim 22, if a pixel is represented by N bits, e.g. N=8; then the wavelet coefficient is represented with a number of bits not greater than N bits, e.g. N=8. Kolarov teaches that it is very common for a pixel to be represented by 8 or 12 bits – fourth full paragraph in c. 12. In c. 19, line 19 – c. 20, line 5, Kolarov shows a binary representation of 8 bits per wavelet coefficient, which is "no greater than a number of bits representing each of the data elements", i.e. pixels of the image, just as claimed.

Applicant's claim/invention: Input N bits → Wavelet Transform → Output N bits or less

Kolarov: Input N bits → Wavelet Transform → Output N bits or less

Contact Information

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy M. Johnson whose telephone number is (703) 306-3096, or the Supervisory Patent Examiner, Bhavesh M. Mehta, whose telephone number is (703) 308-5246.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone numbers are (703) 305-4700 or (703) 305-4750, or Customer Service at (703) 306-0377.

The Group Art Unit FAX number is 703-872-9314.

Timothy M. Johnson
Patent Examiner
Art Unit 2625
August 17, 2003


TIMOTHY M. JOHNSON
PRIMARY EXAMINER